

Evaluating the Utility of the Talent Development Environment Questionnaire as a Tool to Drive
Excellence in Elite Sport Environments

Andrew J. A. Hall and Leigh Jones

Hong Kong Rugby Union, Causeway Bay, Hong Kong

Russell J.J. Martindale

Edinburgh Napier University, School of Applied Sciences, Edinburgh, UK

Acknowledgments

The authors would like to thank the Hong Kong Rugby Union for full access to the Elite Rugby Program and their staff.

Correspondence concerning this article should be addressed to Dr Russell Martindale, Edinburgh Napier University, School of Applied Sciences, Sighthill Campus, Edinburgh, EH11 4BN. E-mail: r.martindale@napier.ac.uk

Submission Date: 29th March 2019

Abstract

Currently, little work has evaluated the impact of interventions within talent development environments (TDEs). This study is the first of its kind to evaluate the efficacy of utilising the Talent Development Environment Questionnaire (TDEQ) as a tool to help coaches and support staff gain feedback, structure interventions, and evaluate impact over a 12-month period of an international elite TDE. Sixteen full time professional male rugby union players, the Chief Rugby Operations Officer, General Manager of Rugby Performance, and the Head of the Elite Rugby Program participated in the research. The TDEQ baseline results identified 17 weaknesses and nine strengths. Subsequently, an evidence based intervention designed by a staff and player working group was implemented. After the 12-month intervention, there were five weaknesses and 18 strengths with seven targeted and five non-targeted TDEQ items showed statistically significant improvements. Implications for practioners and policy makers on the use of the TDEQ as a mechanism for evidence based impact on evaluation, intervention design, and monitoring in elite TDEs are discussed.

Key Words: TDEQ, Intervention, Developing Potential, Coaching

Evaluating the Utility of the Talent Development Environment Questionnaire as a Tool to
Drive Excellence in Elite Sport Environments

Across the sporting world, significant sums of money are invested in the drive for high performance (Henriksen, Stambulova, & Roessler, 2011). For example, UK Sport spend approximately £100 million a year in the pursuit of excellence. While the rewards for achieving success are no less impressive in smaller sporting nations, with the incentive of US\$1 million of prize money for gold medal Singaporean Olympians (Wang, Pyun, Li, & Lee, 2016). Achieving this desired success requires more than merely selecting the most talented individuals, without significant investment at an individual and environmental level, innate talent will never be enough (Abbott & Collins, 2004; Gagné, 2004; Martindale, Collins, & Abraham, 2007; Mills, Butt, & Maynard, 2014).

The shift in emphasis away from the identification of talent towards understanding the talent development process is becoming more evident in the literature. Over the past decade, researchers have focused more on understanding the environmental features of effective development because it appears to be the most controllable factor in the development and potential success of an athlete (Collins & Macnamara 2012; Douglas & Martindale, 2008; Henriksen, Stambulova, & Roessler, 2010; Holt & Dunn 2004; Larsen, Alfermann, Henriksen, & Christensen, 2013; Martindale, Collins, & Daubney, 2005; Mills et al., 2014; Pankhurst, Collins, & Macnamara, 2013; Webster, Hardy, & Hardy, 2017).

The Talent Development Environment Questionnaire (TDEQ) was designed and developed as a result of the growing need to understand and measure the processes of effective development environments (Martindale et al., 2010; Martindale, Collins, Douglas, & White, 2013). The foundation of this questionnaire was based on previous work by Martindale and

colleagues (Martindale et al., 2005; Martindale et al., 2007) who identified four generic features of a talent development environment, namely:

- 1) Long term aims and methods,
- 2) Wide ranging coherent messages and support,
- 3) Emphasis on development rather than early success,
- 4) Individual and ongoing development.

The TDEQ measures the key holistic and generic processes involved in effective development of individuals with the aim of facilitating sporting potential to world class standard (Martindale et al., 2010). It is important to note that the development of the TDEQ was carried out in line with standard guidelines for questionnaire development (Johnston, Leung, Fielding, Tin, & Ho, 2003). Specifically, 135 items were initially generated from the environmental features identified through the research. Following this, the face validity, content validity, comprehensibility and comprehensiveness were evaluated and checked using a number of expert panels and athlete groups. This led to the reduction of TDEQ items to 68, maximizing comprehensibility to young athletes, whilst maintaining overall content validity. Subsequent exploratory factor analysis led to the emergence of a valid and reliable 59-item, seven-factor solution (Martindale et al., 2010):

- 1) Long Term Development Focus (24 items),
- 2) Quality Preparation (five items),
- 3) Communication (seven items),
- 4) Understanding the Athlete (four items),
- 5) Support Network (eight items),
- 6) Challenging and Supportive Environment (three items),

7) Long Term Development Fundamentals (seven items).

Since its development, the TDEQ has been used by a number of researchers to examine TDEs across a number of sports and contexts (Brazo-Sayavera, Olivares, Andronikos, & Martindale, 2017). For example, Martindale et al. (2013) identified that *quality preparation* and *understanding the athlete* were critical discriminators in establishing player progression from junior to senior status through rugby and swimming academies. Mills and colleagues (2014) researched elite football academies in the UK and acknowledged how players' perceptions through the TDEQ might be used to help optimise academy programs by "drilling down" (Mills et al., 2014, p. 1470) to the specifics of a player's development. This process highlighted the importance of engendering an athlete-centered approach to the development culture within football academies. Further work within elite youth football and sport schools revealed the relationship between key features of the TDE and important outcomes such as progression, motivation, stress and wellbeing (Ivarsson, Stenling, Fallby, Johnson, Borg, & Johansson, 2015; Wang, Sproule, McNeill, Martindale, & Lee, 2011).

Further work has focused on questionnaire translation and the development a shortened TDEQ with improvements in its psychometric properties (Wang et al., 2011; Li, Wang, Pyun, & Martindale, 2015). However, in order to maximize the ecological validity and usefulness of the TDEQ for some applied-focused research, the original 59-item TDEQ is recommended for use using an item-by-item analysis (Mills et al., 2014).

Ivarsson et al. (2015) also recognized the need for future studies to utilise the TDEQ as a key process measure for athletes' progression. Likewise Martindale et al. (2013) noted a similar gap with respect to the research in assessing the TDEQ's value as a tool to help structure and evaluate the impact of interventions within TDE. While there have been examples of

intervention strategies within TDEs (Larsen, Henriksen, Alfermann, & Christensen, 2014) none relate specifically to the utility of the TDEQ. Subsequently, the aim of this novel research was to evaluate the efficacy of utilizing the TDEQ as tool to help coaches and support staff gain feedback, structure an intervention, and evaluate impact over a 12-month period of an international elite TDE, namely the Hong Kong Rugby Union's Elite Rugby Program (ERP). The TDEQ is hypothesized to be an impactful, and practical tool to help facilitate effective evidence based practice within talent development environments.

Method

Context

The ERP is the Hong Kong Rugby Union's (HKRU) first fully professional XV's rugby program. Established in the summer of 2015, the ERP's core aims were to maximize potential for Rugby World Cup (RWC) 2019 qualification and ensure qualification for 2023. While the ERP is a senior professional program, it was viewed as a talent *development* environment. The early career nature of this emerging nation's elite program aligned itself more with talent development environments than many other elite programs (Battochio, Stambulova, & Schinke, 2016).

Players are centrally contracted to the HKRU through the ERP and follow a typical full time professional training program during the day. They also train twice a week for their respective clubs. Additionally, they play weekly club games on a Saturday, with international fixtures at specific stages of the season.

Participants

Research participants.

Sixteen full time professional male rugby union players centrally contracted by the

HKRU to the ERP participated in the study. All players were part of the ERP and their demographics can be found in Table 1.

PLEASE INSERT TABLE 1 ABOUT HERE

Research staff.

The Chief Rugby Officer (CRO) and General Manager of Rugby Performance (GM) (48.4 ± 8.7 years old) assisted in research development as members of the supporting staff. The CRO led the HKRU's entire operation in both the participation and performance departments of rugby in Hong Kong and played a significant role in the strategic creation of the ERP. The GM managed the ERP and oversaw the HKRU's professional rugby seven's program in collaboration with the Hong Kong Sports Institute. The GM was also Hong Kong Rugby's National Head XV's Coach. Both the CRO and GM were extensively qualified, fitting a similar criterion to Mills, Butt, Maynard, and Harwood's (2012) elite coaches, having many years of coaching experience (18.2 ± 12.8 years) and both qualified to a Level five standard in their tier 1 home Union. The Head of the ERP (HoERP), a UKCC Level four qualified coach with seven years of professional coaching experience, was the primary researcher. The HoERP was responsible for the planning and implementation of the ERP, operationally leading the program on a day-to-day basis.

Procedure

The study received institutional approval from both Edinburgh Napier University's ethics committee and the HKRU before players and management of the Hong Kong ERP and HKRU were contacted in person by the primary researcher. Each of the participants was provided with a participant information form and had an opportunity to ask questions. Those players who volunteered to participate provided informed consent and arranged to complete the TDEQ at a

convenient time to them.

The results from the TDEQ were used to identify areas in need of improvement and structure an intervention program accordingly. The CRO and GM as well as the HoERP and five senior players formed a working group. After reviewing the feedback, the working group developed a 12-month intervention plan, with a clear aim of explicitly targeting the weaknesses identified from the baseline TDEQ data (see Table 2). The majority of the intervention elements were implemented within four months. During the first month of implementation the working group met formally at the start of each week to discuss which changes would be targeted immediately and which elements would take more time. For example, player education sessions, process focused coaching, improved coach-player interactions began immediately, whereas creating a guardian group and facilitating player led sessions took more time to evolve. These formal meetings lasted no more than 30 minutes and were continued on a monthly basis after the first month. These formal meetings were supplemented by further informal meetings and communications if any elements needed added consideration. After the implementation of the 12-month intervention program, the original 16 players completed the TDEQ a second time.

Talent Development Environment Questionnaire

Due to the applied nature of this research, the original 59-item TDEQ was utilised to maximize ecological validity. Martindale et al. (2010) recommended examining the TDEQ on an item-by-item basis for this type of work, as utilised by Mills et al. (2014). Each item offered a six-point response scale ranging from strongly agree to strongly disagree, where a low score represents a strength and a high score a weakness. Adequate reliability and validity for the TDEQ has been previously demonstrated (Martindale et al., 2010; 2013).

As a *team* of coaches were responsible for the delivery of the rugby program at the ERP

any question that referred to *My Coach* the players were asked to consider the HoERP in their response. As a result of the need for context specific versions of the TDEQ (Mills et al., 2014), players were instructed to leave any questions that they considered to be irrelevant to their current experience blank. Due to the small number of participants, items with any blank responses were left out of the analysis, leaving 55 items.

In both stages of the research the TDEQ was issued to all players during their working day, taking approximately 15 minutes to complete. Players were not required to provide demographic details in order to retain their anonymity and avoid potential impression management (Smith & Christensen, 1995).

Data Analysis

TDEQ responses were coded from one (strongly agree) to six (strongly disagree), in line with previous research (Mills et al., 2014). For questions that were negatively framed the coding scale was reversed. Mean scores were established for every question. Items scoring two and below were identified as perceived strengths and those scoring three and above highlighted as areas for improvement. The likert scale labels provide some qualitative context to the mean scores, specifically one (strongly agree), two (agree), three (agree little bit), four (disagree a little bit), five (disagree), and six (strongly disagree). An alpha level of .05 was used for all statistical tests, and partial η^2 was used as an index for effect size (small .01; medium .06; large .14).

Results and Discussion

Baseline TDEQ Item Scores

The strengths (grey rows) and weaknesses (black rows) emerging from the baseline data are represented below in Table 2. Using the criteria outlined in the methods, there were 17 weaknesses and nine strengths identified.

PLEASE INSERT TABLE 2 ABOUT HERE

Sixteen items were specifically targeted as areas to improve over a 12-month period. In order to focus the intervention appropriately, the working group reviewed the 16 items and collated similar items under themes that were meaningful to the context. Table 3 highlights the grouping of the particular questions, and these themes are used to structure the intervention plan.

The single item omission referred to the opportunities players would experience if they had a dip in performance. This is an example of where the ERP coaches are challenged with balancing the need of long-term development against short-term results. A player whose form drops below the required professional expectations, while he would naturally have continued access to the expertise and support required to improve performance, would not expect the opportunity to play. In line with this, consistent poor performances would ultimately result in a contractual release from the program, due to the importance of performance outcomes to Hong Kong's continued progression in their 2019 World Cup campaign. As such, the working group decided to focus on the remaining 16 items as part of the intervention program.

PLEASE INSERT TABLE 3 ABOUT HERE

Intervention Programme Development

Forward planning, welfare & psychological skills provision.

Weekly education sessions.

In response to the need for improved forward planning, weekly player education sessions were scheduled into the ERP timetable. These were information giving sessions, but also opportunities to reinforce the rationale and philosophy for key training and competition phases.

Athlete welfare manager recruitment.

Improved player welfare and psychological skills provision was targeted through the recruitment of an Athlete Welfare Manager (AWM). The AWM helped with transitions (e.g., injury, selection, contract non-renewal) and developing skills outside of sport (e.g., education, work experience or internships). With a background in sport psychology the AWM also provided sport psychology education. Furthermore, a referral mechanism was created between the AWM and the HKRU's doctor.

Improved lifestyle monitoring and access to a sport psychologist.

Through the HKRU's strategic partnership with a Super Rugby franchise the ERP players had access to a Super Team's sport psychologist. Two visits to the ERP environment allowed for face-to-face meetings with remote follow up consultancy as required. Players were also given access to a performance lifestyle consultant to help monitor the impact of stress through the working week, as well as sleep quality. Players were provided a full report and an action plan.

Player welfare group implementation and improved well-being focus from coaches.

An internal player welfare group was established where player-selected *guardians* took responsibility for the welfare of other team members. Weekly welfare meetings were made part of the ERP schedule. A referral process to the AWM was introduced, and guardians regularly reported back the ERP coaching staff, offering anonymous player feedback. Furthermore, coaches were asked to focus more time enquiring about players' lives outside of the ERP.

Clarity of required process-focus.

Enhanced process-focus with players.

Goals and feedback for players were designed to explicitly stress the importance of process rather than outcome. Primary responsibilities were explicitly outlined for each positional unit.

These formed the basis of feedback sessions with three reflective questions posed to the player (What did you do well? What will you do differently next time? What will take your game to the next level?).

Reinforcing performance effort and improved progress monitoring.

The HoERP also placed a larger emphasis on effort rather than skill when awarding a weekly *most valuable player*. Education sessions highlighted the progressions the players were making through the season. Training and game GPS metrics combined with individual player effort index for games served to show the regular achievement in the group's process goals and identified where and how the next improvements would be made.

Player empowerment.

Player led planning, peer appraisal and re-conceptualising error.

Whilst remaining within the parameters of the team's playing and training philosophy, increased responsibility was given to the players in relation to training and competition planning. Through targeted periods of the season, players were also given the responsibility of peer appraising game performances and guardians led weekly individual game analysis. The concept of training and competition errors was re-evaluated. *Acceptable* errors were discussed and identified, with increasing player input.

Role models & external expertise.

Improving high status external input and integration of rugby sevens.

The limited access to role models meant that ERP coaching staff utilised their wider network to bring in several experts. These included a recently retired Tier 1 internationalist and current tier 1 forwards coach, who spent a week within the ERP environment. Furthermore, a recently retired Tier 1 internationalist was employed for six-months as a kicking coach. Combined

training with Hong Kong's professional sevens players was added to the ERP schedule to integrate with other experienced players and coaches in Hong Kong.

Training camp with Super Rugby club, and reflection sessions on other high performance teams.

As part of the Super Rugby partnership, the HKRU planned an annual weekly training camp with a franchise development XV. This included the chance for ERP players to talk to and work with the Super Rugby players with the Super Rugby coaching staff, culminating with a high intensity, competitive game. Player education windows were also used to discuss other high performing teams across different sports.

Coherency of external messages.

Regular open meetings with club coaches, players and ERP coach.

The ERP recognised the influence of the club environment on their players. As such, weekly meetings with all club coaches and players provided the opportunity for the HoERP to discuss playing, programming and competition matters, as well as provide opportunities for club coaches and players to share their perspective.

Impact of the Intervention: TDE Process and Performance Outcomes

After the 12-month intervention, a number of positive changes to both TDEQ scores and performance outcomes emerged. Overall, it was clear that TDEQ has been successfully utilised as a tool to assist HKRU coaches, management, and players to structure and evaluate the development of the HKRU's ERP. More specifically, 15 of the 16 targeted weaknesses improved over the intervention with seven items showing significant improvement. There were also improvements to a number of non-targeted items. Important performance outcomes that remain an integral part of the ERP's progression towards RWC qualification showed positive

changes. As identified by World Rugby's Rankings during the 12-month period of the intervention, Hong Kong climbed two places from the 24th (57.31 points) to the 22nd (59.03 points) ranked team in the World. The detailed analysis of performance outcome measures is beyond the scope of this paper. However, framing the process changes that emerged within the context of relevant outcome measures is important, given the goals and elite nature of the ERP.

With regards to the individual TDEQ items (see Table 4), at baseline there were 17 weaknesses and nine strengths (as defined by criteria outlined in the methods). These baseline findings informed a 12-month intervention that was implemented by a working group consisting of the GM, CRO, HoERP, and five senior players. After the intervention, there were five weaknesses (Table 4 black rows) and 18 strengths (Table 4 grey rows). Out of the 16 items targeted by the intervention, seven showed statistically significant improvements, and 15 showed at least a small positive effect. These changes will be discussed, as will the remaining item that failed to show improvement post intervention. Improvements to items that were not specifically targeted by the intervention are also considered, along with the changes to items that were rated as strengths at baseline. Finally recommendations for future research and specific limitations to this current work are presented.

PLEASE INSERT TABLE 4 ABOUT HERE

Improvements to Targeted Weaknesses

Forward planning, welfare and psychological skills provision.

Fifteen of the 16 targeted weaknesses improved over the intervention with seven items showing significant improvement. Three of the five items themed *Forward Planning, Welfare and Psychological Skills Provision* showed statistically significant improvements, with one small and one medium positive effect. Given the strong focus of the intervention on these themed

weaknesses, the significant improvements were encouraging. In relation to forward planning, the following item improved significantly:

- My coach and I often try to identify what my next big test will be before it happens (statistically significant improvement).

The intervention involved implementing a number of strategically placed player education windows through the course of the ERP's training schedule in the lead up to competition phases. In a similar way to Fletcher and Streeter's (2016) research of an elite swimming environment, these classroom-based sessions within the ERP enabled the presentation of detailed analysis on upcoming opposition as well as rationalising specific training methodologies for specific phases. Providing players with clear guidelines of future challenges is a plausible explanation for this reported improvement. This strategy is well established in the pursuit of advanced performance, and is an essential social element of the coach-athlete relationship (Jowett & Carpenter, 2015). Indeed, other TDE intervention programs have highlighted the identification and discussion of future challenges as a key requirement for supporting within career transitions (Larsen et al., 2014).

The second weakness targeted within this theme was linked to player welfare and wellbeing, a critical responsibility of the coach (Lara-Bercial & Mallett, 2016) and according to Martindale et al., (2010) a key tenet of effective talent development environments. Outside of the working group, at a strategic level, the senior management and board of directors recognised the need for, and subsequently employed, an Athlete Welfare Manager (AWM) to cater for players' holistic life-needs. Using a similar model to that of the English Institute of Sport's Performance Lifestyle Support, the AWM's major responsibilities included preparing players for life after rugby. This involved the organisation of further education and/or work placements, as

well as helping the players to manage the transitions, distractions and stresses of professional sport (Stambulova, Engstrom, Franck, Linner, & Lindahl, 2015). In support of the AWM, the working group then implemented two key sub-interventions. An internal player group was created with player-selected guardians each responsible for five or six squad members. The guardians would discuss peer performances with their respective groups as well as factors both internally and externally of the ERP that may be affecting performance. This has similarities with work carried out within other rugby contexts, where greater emphasis is placed on player responsibility in units (Hodge, Henry, & Smith, 2014). An important referral mechanism was created between the guardians and the AWM to report more concerning matters, which is an important consideration in order to protect both the guardians and players from dealing with anything beyond their remit. The coaches were also encouraged to develop their interpersonal knowledge of the playing squad by spending brief periods throughout the course of a week enquiring about players' lives outside of rugby (Martindale et al., 2007). In line with this, improvements were apparent to the items below:

- My coach rarely talks about my wellbeing (statistically significant improvement);
- My coach doesn't appear to be interested in my life outside sport (positive medium effect size).

The importance of the ERP making improvements in this area cannot be understated, as an athlete's wellbeing and welfare is strongly linked with performance (Rees, 2007). It is worth noting that the ERP also hired the services of an external Performance Lifestyle Consultant to monitor the biological impact of stress, as part of the intervention package to target these items. However, as this was a one off arrangement, it is fair to conclude that the ongoing strategies listed are likely to have had greater impact.

Given its association with positively affecting the outcomes and processes of talent development environments improving the ERP's psychological skills provision was an essential target through the course of the intervention (Larsen et al., 2014; MacNamara, Button, & Collins, 2010). Improvements were reported to:

- There are people who help/teach me how to deal positively with any nerves or worries that I experience (statistically significant improvement);
- I am rarely encouraged to plan for how I would deal with things that might go wrong (positive small effect size).

Conceivably these changes could be attributed to the recruitment of the AWM and their background in sport psychology. The AWM used the education sessions in the ERP's schedule to provide players with fundamental information and instruction of psychological skills for high performance. In addition, underpinning the day-to-day access of the AWM, through the HKRU's strategic link with one of New Zealand Rugby's Super Rugby franchises, the ERP players also had access to a sport psychologist linked to one of the Super Teams. While his visits to Hong Kong were limited over the 12-month intervention, the players were able to remotely access his support.

Clarity of required process focus.

A further five items themed *Clarity of Required Process Focus* reported improvements including four statistically significant changes:

- I am regularly told that winning and losing just now does not indicate how successful I will be in the future (statistically significant improvement);
- Developing performers are often written off before they have had a chance to show their real potential (statistically significant improvement);

- My coach emphasises that what I do in training and competition is far more important than winning (statistically significant improvement);
- The guidelines in my sport regarding what I need to do to progress are not very clear (statistically significant improvement);
- My coaches care more about helping me to become an elite performer than they do about having a winning team/performer right now (positive small effect size).

In order to address these items, the working group developed a system to ensure coaches' feedback sessions with the players emphasised process rather than outcome (Hodges et al., 2014). However, it is important to note that process driven feedback was not at the expense of competitiveness or developing a winning mentality (Mills et al., 2012). Indeed, reinforcing effort and attitude over performance outcome was one way the HoERP continued to foster this winning mentality as part of their drive for maximizing short term success, as well as long term progression.

Player empowerment.

There were five further improvements from themes *Player Empowerment*, as well as *Role Models and External Expertise*, and *Coherency of External Messages*. The items themed under *Player Empowerment* had a small positive effect from pre to post intervention:

- My coach allows me to learn through making my own mistakes (positive small effect size).
- I am involved in the decision making regarding my development (positive small effect size).

The HoERP and his coaches reflected on their approach to mistakes and formulated a plan to encourage players to take more responsibility in relation to their skill learning. This involved reducing the amount of explicit feedback and instruction provided by the coaches (Renshaw, Chow, Davids, & Hammond, 2010) and encouraging the players to utilize their own

intrinsic feedback more often. Fostering this type of learning environment is fundamental in creating players with greater decision-making abilities, essential for performance (Nash, Sproule, & Horton, 2011).

Role models and external expertise.

Two items themed *Role Models and External Expertise* showed a small effect following the intervention:

- I don't often get help from more experienced performers (positive small effect size).
- My coach and I talk about what current and/or past world class performers did to be successful (positive small effect size).

These particular items proved challenging weaknesses to target. It is important to note that this problem has been highlighted previously as a typical issue for many TDEs (Larsen et al., 2014). However, in this context, it may be due to the fact that the ERP is the HKRU's sole professional XV's program and these players are often considered the best in Hong Kong. Nevertheless, peripatetic coaches, who were also former tier one internationalists, were utilised on a consultant basis to input to the players. Also, attempts were made to maximize the exposure of the players to a Super Rugby franchise's development squad and coaches in an annual training week to Hong Kong. However, these interventions were perhaps too sporadic for the players to recognise significant improvements with this item. The intervention targeting this item also included numerous combined sessions with Hong Kong Sevens players, but had little recognized effect. The ERP players may have perceived the professional sevens players as peers rather than 'more experienced performers' hence the small effect. Indeed, it is important to note that the second of these items, whilst showing improvement, remained a weakness.

Coherency of external messages.

The specific item themed *Coherency of External Messages* showed improvement:

- The advice from significant others fits well with the advice I get from my ERP coaches (positive medium effect size).

While the ERP coaching team would have a limited impact on players' significant others outside of the environment, similar to Pankhurst et al. (2010) the HoERP recognized the importance of ensuring clarity, consistency and coherency of messages to players across key stakeholders within, and outwith the program. Weekly meetings were held by ERP staff with each of the players' respective club coaches. This helped to ensure consistency for the players and reinforced good process from both top down (ERP) and bottom up (club coach) perspectives. It was also considered important for players to be included in all discussions to improve ownership and clarity. These changes potentially led to the reported TDEQ improvement.

Ongoing Weaknesses Post Intervention

Three of the existing 16 targeted weaknesses showed no statistically significant improvements and remained weaknesses following the 12-month intervention. Two of these items were themed in *Role Models and External Expertise*:

- My coach and I talk about what current and/or past world class performers did to be successful (positive medium effect size);
- I often have the opportunity to talk about how more experienced performers have handled the challenges I face (no effect).

The HoERP used the education windows with the ERP players to discuss other high performing environments across different sports, assessing what aspects of these different environments could be implemented within the ERP. These specific education sessions occurred sporadically through the course of the 12-month intervention. There is no record of the detail of

the content of these sessions. As such, these specific sorts of discussions may not have been sufficiently regular for the players to acknowledge any substantial change to the baseline weakness. Other TDE research also highlights the ongoing challenge of integrating role models into daily life of athletes to help with these elements (Larsen et al., 2014).

Although a small positive change was recorded over the 12-month period, another weakness that remained was from the *Player Empowerment* theme:

- I am involved in the decision making regarding my development (positive small effect size).

A number of additional coach-player communication points were introduced by the working group, including player led planning and peer appraisal. However, it is important to note that these player led sessions were elements of the intervention that took the longest to implement. It is also difficult to gauge how much involvement was given to players, without a documentation of sessions. Given the relatively inexperienced nature of many of the players it may have been challenging for coaches and management staff to facilitate player input to development decisions. Perhaps a more substantial intervention, including changes in leadership structure would be needed to make a more significant change here (Hodge et al., 2014).

A new weakness not recognized in the baseline TDEQ was reported post intervention:

- If it didn't work out for me here, there are other good opportunities that would help me to keep progressing in my sport or related other careers (negative small effect size).

Given there are only two professional rugby programs in Hong Kong (ERP and the HKSI 7s) there are naturally a restricted number of professional playing opportunities and indeed coaching and/or administrative roles. Helping to mitigate the lack of opportunities in professional rugby, the AWM offered career transition advice to each player encouraging an *earn or learn* philosophy. On a player's day off, they had the opportunity to attend a further

education course and/or have regular work experience or internship placement. In a similar way to Henriksen et al. (2011) the AWM supports players' sport-education balance, thus preparing them for life in society once their professional sporting careers are over, a transition that can often be troublesome (Alfermann, Stambulova, & Zemaityte, 2004; Debois, Ledon, & Wylleman, 2015; Stambulova et al., 2015). This element of the intervention may have highlighted the lack of rugby options that exist for the players in the ERP.

Collateral Improvements and New Reported Strengths

In conjunction to the 15 improvements reported in the targeted items there were an additional 11 items, although not specifically targeted, that demonstrated enough improvement to be recognized as strengths (i.e. a score of two or below) following the intervention.

Five of these improvements were statistically significant and closely linked to the targeted themes of *Clarity of Required Process-Focus* and *Forward Planning, Welfare and Psychological Skills Provision*. The process focused items that significantly improved included:

- I am constantly reminded that my personal dedication and desire to be successful will be the key to how good a performer I become (statistically significant improvement);
- My progress and personal performance is reviewed on a regular basis (statistically significant improvement);
- I am not taught that much about how to balance training, competing and recovery (statistically significant improvement);

This can most likely be attributed to the HoERP's attention to rewarding effort at training and the change to a process driven review approach as previously identified. Furthermore, the educational sessions where elements of training rationale and indeed recovery strategies were all discussed is also likely to have been influential. The remaining two items that significantly

improved specifically refer to the level of support a player experienced within the ERP and ease of access to this support. Improvements were made to items:

- If I got injured I believe I would continue to receive a good standard of support (statistically significant improvement);
- I can pop in a see my coach or other support staff whenever I need to (statistically significant improvement).

Addressing each item respectively, the support of injured athletes is paramount within any sporting environment (Ivarsson, Traneus, Johnson, & Stenling, 2017). Within the ERP the players' medical support was dovetailed by that of the AWM who helped manage any psychological issues associated with sports injury and rehabilitation (Ivarsson et al., 2017; Newman, Howells, & Fletcher, 2016). Secondly, the ease with which players are able to access support is another crucial element of any TDE (Martindale et al., 2010). The improvements made to this accessibility were most likely influenced by the ERP changing its training venue through the course of the intervention. Previously located in three different locations, the medical, rugby, strength and conditioning and AWM support resources were now all housed in the same training center. While the relocation was not directly part of the intervention, it coincided with the data collection and perhaps accounts for the positive change to these items.

The six other items that showed improvement trends, albeit insignificantly, were also linked to process-focus and welfare themes. Firstly, the two items linked to the welfare of the athletes were again tied to the support they received and also the manner with which this support was operationalised;

- My coaches talk regularly to the other people who support me in my sport about what I am trying to achieve (positive medium effect size);

- Organisation is a high priority to those who develop my training program (positive medium effect size).

The changes to these items potentially relates to the interdisciplinary approach of the ERP coaching group, not only in their discussion of players' personal development, but also in the integrated planning of various training phases throughout the season (Carson & Collins, 2017). While the players may have now recognised these items as specific strengths, the interdisciplinary nature of the ERP was in place from its inception. The change in player perception may be implicitly driven by the visible number of meetings the coaching and support staff have. This may have been facilitated by the ERP's new centralized facility, where there is more transparency of interactions. It may also be a further byproduct of the additional meetings with club coaches and education sessions where each new phase is detailed and discussed prior to its commencement.

Three other improvements are again tied to players' welfare and refer to the approachability and support available to ERP players;

- My coach is a positive supporting influence on me (positive medium effect size);
- My coaches and others who support me in sport are approachable (positive medium effect size);
- Currently I have access to a variety of different types of professionals to help my sport development (positive medium effect size).

While the HoERP and his coaching team are tasked with driving performance standards towards RWC qualification, it is important a human relationship is maintained with the players (Lafreniere, Jowett, Vallerand, & Carbonneau, 2011). As a byproduct of the HoERP and his assistant coaches spending more time building rapport with the players, the perceptions of coach

and support staff approachability may have improved. The increased perception of the variety of support staff available to the players perhaps affirms the value of the part time consultants and the external expertise utilised through the course of the intervention, in addition to the support employed on a full time basis by the HKRU (i.e. AWM). The final item that showed an improvement:

- My coach and I regularly talk about things I need to do to progress to the top level in my sport (positive small effect size).

This small effect could be attributed to the coaches' focus on process over outcome when providing player feedback and the more systematic education sessions carried out to identify and discuss future challenges outlined earlier.

Changes to Baseline Strengths

Of the nine baseline strengths reported, seven remained following the intervention – three showed a small improvement and four reported no effect. Two of the items however scored outside the strength range (i.e. over two) after the intervention and while the changes were only small, are important to acknowledge:

- My coaches and those who support me give me straight answers to my questions (negative small effect size);
- All the different aspects of my development are organised into a realistic timetable for me (negative small effect size).

As previously discussed, improving the clarity of messages given to players was high on the intervention agenda. The HoERP and support staff worked hard to facilitate improved coherency and continuity of messages from key stakeholders both within the ERP and the club game in Hong Kong. Perhaps the higher score refers to the answers received by support outside

of the ERP. In this instance we see a limitation of the TDEQ where the players may have misconstrued the detail of this particular item with the need for further qualitative enquiry. Referring to the players' timetable this is again an item that is difficult to explain without further insight from the players. The ERP schedule is carefully planned taking into account micro and macro training loads, as well as providing sufficient time for recovery and earning or learning as previously highlighted. The week-to-week schedules are also discussed with the players during their education window, rationalising the approach of the specific phase. Furthermore, an annual plan is provided at the start of the season detailing player holidays allowing them to plan in advance. Perhaps the players completed the follow up TDEQ in a particular busy day or training phase that may have influenced the, albeit, small drop in this item.

Recommendations and Limitations

From a research and applied practitioner's perspective the results clearly demonstrated the efficacy of the TDEQ as a tool to evaluate, inform intervention development, and measure impact on the development of HKRU's ERP. Having a longitudinal design allowed for a more accurate assessment of the utility of the Talent Development Environment Questionnaire. However, it is important to note that the small sample size and inability to measure item-to-item changes across individuals makes it difficult to generalize the results of the present study to future application of the TDEQ. The work is also specific to the Hong Kong Rugby Union's Elite Rugby Program and affiliated management staff, and as such this context needs to be kept in mind when making judgments related to generalisability. Furthermore, given the real world application of this intervention process within an elite environment, it was not possible to have a control group. As such, it must be recognized that there are multiple confounding variables that cannot be directly accounted for, which weakens any cause and effect claims of efficacy.

A major benefit of utilising the TDEQ was to evaluate the environment against a research based set of guidelines for effective practice. This helped the ERP working group to identify and subsequently target key elements within their environment. Aspects of the ERP's player welfare and psychological skills provision as well as the need to place a greater focus on process over outcome with respect to coaching and feedback were of particular importance. The working group developed a number of logical and effective intervention ideas in response to the TDEQ feedback. Indeed many of which resonated with research evidence. Of course, more examples of good practice or accessible evidence based intervention ideas would help facilitate the development of effective intervention strategies by coaches, working groups and policy makers. It may be ideal, or in some circumstances necessary for an external practitioner with strong evidence based knowledge and expertise to help drive intervention strategies within TDEs (Henriksen, 2015; Larsen et al., 2014). However, if the TDEQ can act as a mechanism to help coaches identify areas for improvements and inform decision making without outside expert input, this may facilitate ownership and more wide spread evidence based practice. This study outlines how this process can be carried out, whilst highlighting the importance of this type of research and providing evidence that the TDEQ can be a useful and practical tool to help facilitate effective evidence based practice within talent development environments.

Moving forward, based on the findings from this research, the following recommendations and limitations were identified to help guide practitioners in similar developing sport environments: (a) while the 59 item TDEQ is split into recognised factors, utilising the TDEQ on an item by item basis, and theming the responses specific to one's environment through working group discussions allows for a more informed context driven intervention; (b) the TDEQ's content is structured towards younger athletes which may require

contextualising the wording of items to the specific environment; (c) the make up of the working group responsible for creating and driving any implementation is a key consideration. Key stakeholders from all management levels of the organisational structure should be considered to influence not only the day to day working of the environment, but also that of senior hierarchy and potentially board level. Including players within the working group is critical for establishing buy in. For example, in this study the CRO's role was crucial in sanctioning any additional budgetary requirements over the 12 months i.e. paying for consultant coaches and other external expertise. The GM also played a significant role in the working group ensuring the content of the intervention stayed within the confines of the wider strategic plan. The HoERP's role was vital in the delivery of the intervention day-to-day with the senior players offering the working group an important end user appraisal of the suggested interventions; (d) for this research the HoERP was the primary researcher so there was a necessity for athletes' responses to remain anonymous. This made item-to-item changes across individuals impossible to measure; (e) in a similar way being the primary researcher the HoERP was unable to follow up with players to discuss their individual responses gathering more qualitative data. Moving forward, we suggest an outsider, or someone with the ability to work confidentially, act as the primary data gatherer allowing for more exploratory qualitative data analysis to deepen the meaning to the TDEQ responses; and finally (f) the results of this particular research are not a representation of the entire ERP playing group, as it was important the same players completed the TDEQ pre and post intervention. This is difficult to manage given the transient nature of professional sport playing rosters.

Disclosure Statement

No financial interest or benefit has arisen from the direct application of this research.

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Table 1

Demographics of the 16 Participants

Age	Nationality	Professional Rugby Experience
Range: 20 to 33 years old	Australians (2)	Professional in Hong Kong – first year (10)
Mean: 26.1 (\pm 2.4) years old	British (5)	Professional in Hong Kong – Second year (1)
	Fiji	Previous professional experience outside of
	France	Hong Kong - less than four years (5)
	Hong Kong Chinese (3)	
	New Zealanders (2)	
	South Africans (2)	

Table 2

The Strengths (Grey Rows) and Weaknesses (Black Rows) of the ERP Following Baseline Data from the TDEQ

Item	Mean
My coach and I talk about what current and/or past world class performers did to be successful	4.13
I am regularly told that winning and losing just now does not indicate how successful I will be in the future	4.06
Developing performers are often written off before they have had a chance to show their real potential	3.88
I would be given good opportunities even if I experienced a dip in performance	3.75
My coach emphasises that what I do in training and competition is far more important than winning	3.69
I am involved in the decision making process regarding my development	3.50
My coach rarely talks to me about my well-being	3.44
My coach and I often try to identify what my next big test will be before it happens	3.31
I often have the opportunity to talk about how more experienced performers have handled the challenges I face	3.25
The advice from significant others (wife/partner, friends, parents, club coach etc) fits well with the advice I get from my ERP coaches	3.13
The guidelines in my sport regarding what I need to do to progress are not very clear	3.06
There are people who help me/teach me how to deal positively with any nerves or worries that I experience (e.g. coaches, athlete welfare manager, psychologists)	3.06
My coach doesn't appear to be that interested in my life outside of sport	3.06
My coaches care more about helping me to become an elite performer, than they do about having a winning team/performer right now	3.06
I am rarely encouraged to plan for how I would deal with things that might go wrong	3.06
My coach allows me to learn through making my own mistakes	3.06
I don't often get any help from more experienced performers	3.00
My coach plans training to incorporate a wide variety of useful skills and attributes, for example, techniques, physical attributes, tactical skills, mental skills, decision making	2.00
I spend most of my time developing skills and attributes that my coach tells me I will need if I am to compete successfully at the top/professional level	2.00
My coaches and those who support me give me straight answers to my questions	2.00
All the different aspects of my development are organised into a realistic timetable for me	1.94
My training is specifically designed to help me develop effectively in the long term	1.88
My coach constantly reminds me what he expects of me	1.88
My training sessions are normally beneficial and challenging	1.81
My coach emphasises the need for constant work on fundamental and basic skills	1.75
My development plan incorporates a variety of physical preparation such as S&C, core, flexibility, agility, co-ordination, balance etc	1.63

Table 3

Themed Weaknesses of the ERP at Baseline

Target Items	Intervention Theme
<p>Q9. I am rarely encouraged to plan for how I would deal with things that might go wrong</p> <p>Q27. My coach and I often try to identify what my next big test will be before it happens</p> <p>Q51. There are people who help me/teach me how to deal positively with any nerves or worries that I experience (e.g. coaches, athlete welfare manager, psychologists)</p> <p>Q18. My coach doesn't appear to be that interested in my life outside of sport</p> <p>Q34. My coach rarely talks to me about my well-being</p>	<p>Forward Planning, Welfare & Psychological Skills Provision</p>
<p>Q1. My coaches care more about helping me to become an elite performer, than they do about having a winning team/performer right now</p> <p>Q26. Developing performers are often written off before they have had a chance to show their real potential</p> <p>Q37. I am regularly told that winning and losing just now does not indicate how successful I will be in the future</p> <p>Q64. My coach emphasises that what I do in training and competition is far more important than winning</p> <p>Q30. The guidelines in my sport regarding what I need to do to progress are not very clear</p>	<p>Clarity of Required Process-Focus</p>
<p>Q41. I am involved in the decision making process regarding my development</p> <p>Q57. My coach allows me to learn through making my own mistakes</p>	<p>Player Empowerment</p>
<p>Q17. My coach and I talk about what current and/or past world class performers did to be successful</p> <p>Q24. I don't often get help from more experienced performers</p> <p>Q62. I often have the opportunity to talk about how more experienced performers have handled the challenges I face</p>	<p>Role Models & External Expertise</p>
<p>Q13. The advice from significant others (wife/partner, friends, parents, club coaches etc) fits well with the advice I get from ERP coaches</p>	<p>Coherency of External Messages</p>

Table 4
Pre and Post Intervention Scores with Significant Changes and Effects (Black Rows Post Intervention Weaknesses, Grey Rows Post Intervention Strengths)

Item	Pre	Post	Sig Diff	Partial η^2	Change
My coach and I talk about what current and/or past world class performers did to be successful	4.13	3.38	NS	0.09	0.75
I am regularly told that winning and losing just now does not indicate how successful I will be in the future	4.06	2.81	P<.05	0.232	1.25
Developing performers are often written off before they have had a chance to show their real potential	3.88	2.75	P<.05	0.147	1.125
I would be given good opportunities even if I experienced a dip in performance	3.75	3.63	NS	NA	0.125
My coach emphasises that what I do in training and competition is far more important than winning	3.69	2.56	P<.05	0.233	1.125
I am involved in the decion makling process regarding my development	3.50	3.06	NS	0.03	0.4375
My coach rarely talks to me about my well-being	3.44	2.75	P<.05	0.153	0.6875
My coach and I often try to identify what my next big test will be before it happens	3.31	2.06	P<.05	0.306	1.25
I often have the opportunity to talk about how more experienced performers have handled the challenges I face	3.25	3.06	NS	NA	0.1875
The advice from significant others (wife/partner, friends, parents, club coach etc) fits well with the advice I get from my ERP coaches	3.13	2.50	NS	0.08	0.625
The guidelines in my sport regarding what I need to do to progress are not very clear	3.06	2.25	P<.05	0.142	0.8125
There are people who help me/teach me how to deal positively with any nerves or worries that I experience (e.g. coaches, lifestyle manager, psychologists)	3.06	2.25	P<.05	0.15	0.8125
My coach doesn't appear to be that interested in my life outside of sport	3.06	2.50	NS	0.068	0.5625
My coaches care more about helping me to become an elite performer, than they do about having a winning team/performer right now	3.06	2.63	NS	0.054	0.4375
I am rarely encouraged to plan for how I would deal with things that might go wrong	3.06	2.63	NS	0.04	0.4375
My coach allows me to learn through making my own mistakes	3.06	2.81	NS	0.017	0.25
I don't often get any help from more experienced performers	3.00	2.63	NS	0.031	0.375
I struggle to get good quality competition experiences at the level I require	2.94	2.13	NS	0.12	0.8125
I regularly set goals with my coach that are specific to my individual development	2.94	2.75	NS	NA	0.1875
If I got injured I believe I would continue to receive a good standard of support	2.81	1.94	P<.05	0.208	0.875
Those who help me in my sport seem to be on the same wavelength as each other when it comes to what is best for me (e.g. coaches, physiotherapists, sport psychologists, S&C Coach, nutritionists, lifestyle advisors etc)	2.81	2.38	NS	0.043	0.4375
I am encouraged to keep perspective by balancing any frustrations I may have in one area by thinking about good progress in others (e.g. slow skill development but good strength gains or poor performances but good technical development)	2.81	2.94	NS	NA	-0.125

If it didn't work out for me here, there are other good opportunities that would help me to keep progressing in my sport or related areas and other careers	2.81	3.06	NS	0.011	-0.25
Feedback I get from my coaches almost always relates directly to my goals	2.75	2.44	NS	0.03	0.3125
My training programmes are developed specifically to my needs	2.69	2.31	NS	0.03	0.375
My university/work placement don't really support me with my sport when I need it	2.63	2.25	NS	0.04	0.375
I feel pressure from my mates in sport to do things differently from what my coaches are asking of me	2.63	2.88	NS	NA	-0.25
My coaches talk regularly to the other people who support me in my sport about what I am trying to achieve (e.g. physiotherapist, sport psychologist, nutritionist, S&C Coach, life style advisor etc)	2.56	1.88	NS	0.101	0.6875
The more experienced I get the more my coach encourages me to take responsibility for my own development and learning	2.56	2.25	NS	0.036	0.3125
I am constantly reminded that my personal dedication and desire to be successful will be the key to how good a performer I become	2.50	1.94	P<.05	0.13	0.5625
My coach and I regularly talk about things I need to do to progress to the top level in my sport	2.50	2.00	NS	0.056	0.5
My coach explains how my training and competition programme work together to help me develop	2.50	2.19	NS	0.037	0.3125
I am being trained to be ready for almost anything that is thrown at me in sport and life	2.50	2.31	NS	0.014	0.1875
My coach is a positive supporting influence on me	2.44	1.94	NS	0.074	0.5
My coach often talks to me about the connections/overlap between different aspects of my training (e.g. technical, tactical, physical & mental development)	2.44	2.31	NS	NA	0.125
I have the opportunity to train with performers who are at a level I am aspiring to	2.44	2.75	NS	0.017	-0.3125
My fellow professionals and I are told how we can help each other develop further in the sport	2.38	2.44	NS	NA	-0.0625
I can pop in to see my coach or other support staff whenever I need to (e.g. physiotherapist, psychologist, strength trainer, nutritionist, lifestyle advisor etc)	2.31	1.38	P<.05	0.175	0.9375
My progress and personal performance is reviewed regularly on an individual basis	2.31	1.38	P<.05	0.29	0.9375
My coach rarely takes the time to talk to other coaches who work with me	2.31	2.13	NS	0.014	0.1875
My coaches and others who support me in sport are approachable (e.g. physiotherapist, sport psychologist, strength trainer, nutritionist, lifestyle advisor etc)	2.25	1.69	NS	0.077	0.5625
Organisation is a high priority to those who develop my training programme	2.19	1.81	NS	0.062	0.375
My coach is good at helping me to understand my strengths and weaknesses	2.19	2.13	NS	NA	0.0625
My coach is good at helping me to understand what I am doing and why I am doing it	2.19	2.31	NS	NA	-0.125
I am not taught that much about how to balance training, competing and recovery	2.13	1.63	P<.05	0.129	0.5
Currently, I have access to a variety of different types of professionals to help my sports development (e.g. physiotherapist, sport psychologist, strength trainer, nutritionist, lifestyle advisor etc)	2.06	1.69	NS	0.083	0.375
My coach plans training to incorporate a wide variety of useful skills and attributes, for example, techniques, physical attributes, tactical skills, mental skills, decision making	2.00	1.69	NS	0.024	0.3125
I spend most of my time developing skills and attributes that my coach tells me I will need if I am to compete successfully at the top/professional level	2.00	1.88	NS	NA	0.125
My coaches and those who support me give me straight answers to my questions	2.00	2.19	NS	0.011	-0.1875
All the different aspects of my development are organised into a realistic timetable for me	1.94	2.06	NS	0.012	-0.125
My training is specifically designed to help me develop effectively in the long term	1.88	1.69	NS	0.018	0.1875

My coach constantly reminds me what he expects of me	1.88	1.75	NS	0.01	0.125
My training sessions are normally beneficial and challenging	1.81	1.75	NS	NA	0.0625
My coach emphasises the need for constant work on fundamental and basic skills	1.75	1.88	NS	NA	-0.125
My development plan incorporates a variety of physical preparation such as S&C, core, flexibility, agility, co-ordination, balance etc	1.63	1.50	NS	NA	0.125